

## 198 Faraday's Researches

before the electric current is produced, and  
*before* of the different metals is made (650); in fact,, at  
 that moment when chemical forces only are efficient as a cause  
 of action. I took a voltaic apparatus, consisting of a single  
 pair of large plates,, namely, a cylinder of amalgamated zinc,  
 and a double cylinder of copper. These were put into a jar  
 containing dilute sulphuric acid/ and could at pleasure be placed in  
 metallic communication by a copper wire adjusted so as to  
 dip at the extremities into two cups of mercury connected  
 with the two plates.

692. Being thus arranged, there was no chemical action  
 whilst the plates were not connected. On *making* the con-  
 nection, a spark was obtained,<sup>2</sup> and the solution  
 was immediately decomposed. On breaking it, the usual spark  
 was obtained, and the decomposition ceased. In this case it  
 is evident that the first spark must have occurred before metallic  
 contact was made, for it passed through an interval of air;  
 and also that it must have tended to pass before the electrolytic  
 action began; for the latter could not take place until the  
 current passed, and the current could not pass before the spark  
 appeared. Hence I think there is sufficient proof, that as it is the  
 zinc and water which by their mutual action produce the  
 electricity of this apparatus, so these, by their first contact with  
 each other, were placed in a state of powerful tension (687),  
 which, though it could not produce the actual decomposition of  
 the water, was able to make a spark of electricity pass between  
 the zinc and a fit discharger as soon as the interval was  
 rendered sufficiently small. The experiment demonstrates the direct  
 production of the electric spark from pure chemical forces.

693. There are a few circumstances connected with the pro-  
 duction of this spark by a single pair of plates, which should  
 be known, to ensure success to the experiment. When the  
 amalgamated surfaces of contact are quite clean and dry, the  
 spark, on making contact, is quite as brilliant as on breaking it,  
 if not even more so. When a film of oxide or dirt was present  
 at either mercurial surface, then the first spark was often feeble,

<sup>1</sup> When nitre-sulphuric acid is used, the spark is more powerful, but local chemical action can then commence, and proceed without requiring

metallic contact.

<sup>2</sup>It has been universally supposed that no spark is produced on making the contact between a single pair of plates. I was led to expect one from the considerations already advanced in this paper. The wire of communication should be short; for with a long wire, circumstances strongly affecting the spark are introduced.